# Course Specification
## (Bachelor)

| | |
|---|---|
| Course Title: | Photochemistry |
| Course Code: | CHM 1445 |
| Program: | Bachelor of Science in Chemistry |
| Department: | Chemistry |
| College: | Science |
| Institution: | Imam Mohammed Ibn Saud Islamic University |
| Version: | 2024 V1 |
| Last Revision Date: | 19 October 2024 |

## Table of Contents

## A. General information about the course:

### 1. Course Identification

| | | | | | |
|---|---|---|---|---|---|
| **1. Credit hours: 2 (2, 0, 0)** | | | | | |
| **2 (2 Lectures, 0 Tutorials, 0 Lab)** | | | | | |
| **2. Course type** | | | | | |
| **A.** | ☐University | ☐College | ☒ Department | ☐Track | ☐Others |
| **B.** | ☐ Required | | ☒ Elective | | |
| **3. Level/year at which this course is offered: Level 7/ 4th year** | | | | | |
| **4. Course general Description:** | | | | | |
| **This course deals with Scientific concepts and Importance of photochemistry, Mechanisms of photochemical reactions, Types of energy transitions, Factors affecting electronic transitions in different photochemical systems, Homogeneous and heterogeneous photo degradation, Methods for measuring rate of photochemical reactions, life time, quantum yield, Quenching constant of photo luminescent compounds, Developing a photochemical system of appropriate design, Photo kinetic, impacts of photochemistry in environmental and industrial sectors.** | | | | | |
| **5. Pre-requirements for this course** (if any)**:** | | | | | |
| **Electrochemistry and Corrosion /CHM 1343** | | | | | |
| **6. Co-requisites for this course** (if any)**:** | | | | | |
| **None** | | | | | |
| **7. Course Main Objective(s):** | | | | | |

***At the end of the course, Students should be able:***

- **Describe the Scientific concepts and the importance of photochemistry.**
- **Recognize the Mechanisms of photochemical reactions.**
- **Define the types of energy transitions and the factors affecting electronic transitions in different photochemical systems.**
- **Recognize homogeneous and heterogeneous photo degradation.**
- **Measure the rate of photochemical reactions, life time, quantum yield, quenching constant of photo luminescent compounds.**
- **Develop a photochemical system of appropriate design**
- **Define Photo kinetic and recent impacts of photochemistry in environmental and industrial sectors.**

### 2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | **30** | **100%** |
| 2 | E-learning | **0** | **0** |
| 3 | Hybrid<br>• Traditional classroom | **0** | **0** |

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| | • E-learning | | |
| 4 | Distance learning | **0** | **0** |

### 3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | **30** |
| 2. | **Laboratory/Studio** | **0** |
| 3. | **Field** | **0** |
| 4. | **Tutorial** | **0** |
| 5. | **Others (specify)** | **0** |
| **Total** | | 30 |

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Code of PLOs aligned with program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| **1.1** | **To describe the Scientific concepts, the importance of photochemistry and the mechanisms of photochemical reactions** | **K1; K2; K3;** | • Two hours are weekly, containing lectures.<br>• A Private study, including work on the home exam. | ▪ Quizzes<br>▪ Assignments<br>▪ Oral Discussion<br>▪ Participation. |
| **1.2** | **To define the types of energy transitions and the factors affecting electronic transitions in different photochemical systems** | **K1; K2; K3;** | • Two weekly hours, lectures<br>• Group discussion | • Assignments.<br>• Quizzes.<br>• Final exam. |
| **1.3** | **To recognize homogeneous and heterogeneous photodegradation.** | **K1** | • Group discussions.<br>• A Private study, including work on homework.<br>• Think and outline homogeneous and heterogeneous photodegradationi mpact | • Midterms.<br>• Assignments.<br>• Oral test<br>• Quizzes.<br>• Final exam. |

| Code | Course Learning Outcomes | Code of PLOs aligned with program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| 1.4 | To outline photo kinetic and recent impacts of photochemistry in environmental and industrial sectors. | K1; K3 | • Two hours are weekly, containing lectures.<br>• A Private study, including work on the home exam. | ▪ Quizzes<br>▪ Assignments<br>▪ Oral Discussion<br>▪ Participation. |
| 2.0 | Skills | | | |
| 2.1 | To calculate the rate of photochemical reactions, life time, quantum yield, quenching constant of photo luminescent compounds | S1; S2; S3 | • Lectures activity<br>Think and talk about types of radioactive decay | • Questions in Lectures.<br>• Short Quizzes and Exams.<br>• Participation through Classwork and Homework. |
| 2.2 | To choose a photochemical system for appropriate design. | S1; S2; S3 | Introduce some examples of photochemical system | • Questions in Lectures.<br>• Short Quizzes and Exams.<br>• Participation<br>• Oral Discussion and Homework. |
| 2.3 | To evaluate oral communication and technical writing skills, including the capability of using electronic mail and networks to communicate with others. | S3 | Lectures activity | • Questions in Lectures.<br>• Short Quizzes and Exams.<br>• Participation.<br>• Oral Discussion and Homework |
| 3.0 | Values, autonomy, and responsibility | | | |
| 3.1 | To show the ability to integrate into teamwork, as well as individually with keeping scientific integrity identity during different assessments, projects, and mini reports | V1, V2 | Group discussion, assignments and homework | • Oral tests, and sheets of Marks<br>• Assignments homework marks |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | Scientific concepts in photochemistry | 2 |
| 2. | Importance of photochemistry | 2 |
| 3 | Mechanisms of photochemical reactions | 2 |
| 4 | Types of energy transitions | 2 |
| 5 | Factors affecting electronic transitions in different photochemical systems | 2 |
| 6 | Homogeneous and heterogeneous photo degradation | 4 |
| 7 | Methods for measuring rate of photochemical reactions, lifetime, quantum yield | 4 |
| 8 | Quenching constant of photo luminescent compounds | 2 |
| 9 | Develop a photochemical system of appropriate design | 2 |
| 10 | Photo kinetic | 4 |
| 11, 1 | Recent impacts of photochemistry in environmental and industrial sectors. | 4 |
| | Total | 30 |

*Topics to be covered (Laboratories)*

| No | List of Experiments | Contact hours |
|---|---|---|
| | None | |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 1. | Midterm Exam 1 | 6th week | 20 % |
| 2. | Midterm Exam 2 | 12th week | 20 % |
| 3. | Quizzes, Home Works, class participation, and mini projects | During the semester | 20 % |
| 4. | Final Exam | 16- 17th week | 40 % |
| 5. | Total | | 100% |

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

| | |
|---|---|
| **Essential References** | ***Photochemistry***, Carol E. Wayne and Richard P.Wayane, Oxford University Press Inc., illus.ISBN: 9780198558866 |
| **Supportive References** | Journal-of-photochemistry-and-photobiology-a-chemistry. |
| **Electronic Materials** | **None** |
| **Other Learning Materials** | **None** |

### 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities**<br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | • Each of the class room should be equipped with a whiteboard and a projector, with a maximum of 20 students.<br>• The rooms are equipped with data show, Smart Board, WI-FI access. |
| **Technology equipment**<br>(projector, smart board, software) | |
| **Other equipment**<br>(depending on the nature of the specialty) | |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | **Students** | Direct: Questionnaire. |
| | **Course Responsible** | Direct: Course e-Portfolio.<br>Indirect: Second examiner checklist-Course report. |
| | **Peer Reviewer** | Direct: Questionnaire.<br>Indirect: External assessor report. |
| Effectiveness of Students assessment | **Program Leaders** | Direct: Course e-Portfolio.<br>Indirect: Course report. |
| | **Students** | Indirect: Second examiner checklist-Course report. |
| Quality of learning resources | **Faculty ( Academic Advisory)** | Direct: course Entrance/Exit.<br>Indirect: Observations - Accreditation review. |
| | **Program Leaders** | Direct: Course e-Portfolio. |

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| | | Indirect: Course evaluation survey- Observations- Syllabus review- Accreditation review. |
| The extent to which CLOs have been achieved | **Course Responsible** | **Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report. |
| | **Program Leaders** | **Indirect:** Exams. |
| Lab Performance | **Students** | Direct: Lab reports, Final Lab exam, Course e-Portfolio. |

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

## G. Specification Approval

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|---|---|
| **COUNCIL /COMMITTEE** | **COUNCIL OF DEPARTMENT OF CHEMISTRY** |
| **REFERENCE NO.** | **7 (NO. 2/3)** |
| **DATE** | **29/3/1446 - 2/10/2024** |